TASMANIAN LAND PLANARIANS.

Descriptions of New Species, &c.

By Thos. Steel, F.L.S., F.C.S.

(Plate xli.)

The first naturalist to collect a land planarian in Tasmania was Darwin, who found one species on the island on the occasion of the visit of the Beagle in 1832, and subsequently described it as *Planaria Tasmaniana* (1, p. 244).* Since then the only additions to our knowledge of the land planarians of Tasmania have been made by Dendy in 1892-3 in his papers read before the Australian Assoc. Adv. Science and the Royal Society of Victoria, and by Graff (10) who worked on material supplied by Dendy. Disallowing *Geoplana balfouri*, Graff, as being really synonymous with *G. Tasmaniana* (Darwin), and *G. Wellingtoni*, Dendy, which is very doubtfully identified by Graff (10, p. 369) from Dendy's description of a single probably immature specimen, which Dendy himself did not venture to identify, we have in the work of these authors a record for Tasmania of 9 species and 1 variety.

In this paper, besides giving an account of the young of a number of species, I redescribe and name the Tasmanian planarian which was identified by Dendy as *G. Lucasi*, Dendy; and in addition describe 1 new species and 1 new variety, and record the occurrence of 2 Australian species not hitherto found, thus bringing the known forms up to 12 species and 2 varieties.

Of these, 6 species and 2 varieties are peculiar to Tasmania, the remainder being also found in Australia.

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* The numbers in brackets refer to the list of references at end of paper.

The following is a list of the names. Those marked A occur also in Australia :—

Geoplana Tasmaniana (Darwin).
„ „ var. *flavicincta*, Steel.
„ *typhlops*, Dendy,
„ * *Adae*, Dendy.....A
„ † „ var. *fusca*, Dendy.
„ † *walhallae*, Dendy .....A
„ *diemenensis*, Dendy.
„ *Mortoni*, Dendy.
„ * *munda*, Fletcher & Hamilton.....A
„ * *variegata*, Fletcher & Hamilton .....A
„ *Dovei*, Steel.
„ *lyra*, Steel.
„ *sanguinea* (Moseley) ....A
„ *Sugdeni*, Dendy ....A

Through the zeal of Mr. H. Stuart Dove, of Launceston, I have been supplied with numerous consignments of planarians collected in the neighbourhood of that town, and also at Table Cape in N.W. Tasmania. The specimens were sent to me by Mr. Dove both alive and preserved, from time to time during the last few years, and his kindness in this matter has enabled me to offer this contribution to our knowledge of a somewhat neglected branch of the Tasmanian fauna.

All the species found so far can be included in the old genus *Geoplana*, no example of a *Rhynchodemus* having yet been met with. There is nothing specially distinctive about the land planarians endemic to Tasmania. They bear a general resemblance to the forms occurring in Australia. Considering the relationship of Tasmania to the mainland, this is to be expected, and, as a matter of fact, the species peculiar to Tasmania do not differ in character from those common to Tasmania and Australia,

* Signifies that I have not seen Tasmanian examples, and † that I have not seen specimens from any locality.

more than local species occurring in individual regions of Australia, differ from one another.

The type specimens of the species described in this paper are deposited in the Australian Museum, Sydney.

Geoplana Dovei, n.sp.

(Plate xli., fig. 1.)

Geoplana Lucasi, Dendy, (6, p. 180, and 8, p. 421, but *not* 3, p. 43; 4, p. 74; nor 5, p. 40, pl. iv. fig. 4), Graff (10, p. 350, in so far as reference is made to the Tasmanian form, but not to the Victorian form); *non* Spencer (9, p. 91).

Geoplana Lucasi was originally described and figured by Dendy from specimens obtained in Victoria. Subsequently he doubtfully ("provisionally at any rate") identified examples of a land planarian procured in Tasmania as belonging to the same species Graff, in commenting on specimens of the Tasmanian worm sent to him by Dendy, contrasts the dorsal markings with those figured and described by Dendy for the Victorian species, and throws doubt on the specific identity of the two. Graff does not appear to have had any of the Victorian species before him, and hesitated about constituting the Tasmanian form a distinct species. He says:—

"Wenn nicht Dendy angäbe, dass bei einem Exemplare die Andeutung eines Medianstreifens vorhanden ist, würde ich auf mein Exemplar hin unbedenklich eine besondere Species begründen."

I have not had an opportunity of seeing examples of the Victorian worm, but have received from Mr. Dove a series of fine specimens collected at Table Cape, Tasmania, agreeing very closely with Dendy's description of the Tasmanian form. So totally different are these, both in the colours and pattern of the dorsal markings, from Dendy's figure and description of the Victorian *G. Lucasi*, that I should never have associated them as being specifically related, and have no hesitation in considering them distinct species. The mere fact of both possessing a median

dorsal line and being of similar shape is by no means sufficient reason for considering them as identical; indeed many of the described species of land planarians from all parts of the world differ less from one another than do the forms under consideration.

As I am satisfied that Dendy's description of the Victorian *G. Lucasi* cannot be made to cover the Tasmanian species, I have deemed it advisable to rename the latter, of which the following is a description :—

Dorsal surface to the eye appears of a uniform dark purplish-brown colour, with a narrow median very dark brown line just distinguishable, extending from end to end in some individuals but disappearing about midway between the ends in others. Under the lens the dark brown of the surface is resolved into very numerous inosculating stipplings, mainly longitudinal, on a groundcolour of somewhat paler brown, and extending uniformly over the whole surface. Ventral surface uniform pale brown with a pinkish tinge.

The body is flattened and leaf-shaped, about equal width for the greater part, curving abruptly to a blunt point posteriorly, and produced at anterior end to a pointed tip.

Eyes large and conspicuous, in a single row round the anterior tip and continued without any grouping, in a row for a few mm. down the sides.

Length in spirit 43 mm. by 7 mm. broad. Peripharyngeal aperture 25 and genital opening 32 mm. from anterior tip. An example when crawling was about 57 mm. in length by 8 mm. wide, and when contracted at rest became shortened considerably and from 10 to 12 mm. wide.

Hab.—Table Cape, Tasmania (Mr. H. Stuart Dove).

In shape and general character this species seems to me to be related to *G. Mortoni*, Dendy, but the markings on both surfaces of the latter are very distinctive.

I have pleasure in associating the name of Mr. Dove with this handsome species in recognition of his excellent work in the collection of land planarians in Tasmania.

Early in September, 1899, an individual of this species which Mr. Dove collected at Table Cape, deposited an egg-capsule, which, together with the planarian, he sent on to me. The box containing the specimens was some 8 days in transit, during which time the capsule hatched. I found two young, together with the adult, in a living and healthy state. The following is a description of the young:—Dorsal surface dark purplish-brown, with stipplings resembling those of the adult. One specimen was 11 and the other 10 mm. in length. The latter has the median dorsal space almost free from pigment, forming a pale brown band with only a few scattered brown specklings, and no indication of the black median line. In the longer specimen this pale space is very faintly indicated, the pigmentation being nearly uniform all over, and the black line is plainly visible exactly as in the adult, extending for about half-way from anterior tip.

Ventral surface in both thickly speckled with brown spots which have a tendency to crowd into the median space and towards the margins, and thus to form three longitudinal bands with less speckled space between.

When alive the cross section of these young was exceedingly angular, the back being raised in the form of an acute longitudinal ridge, giving the little creatures a very slug-like aspect, but otherwise the shape resembled that of the adult. Eyes very large and distinct round anterior tip, and, as in the adult, in a single row without any grouping for a little way down the sides. The eyes at the tip are smallest, and they increase in size down the sides until the last ones have 4 or 5 times the area of those on the tip.

A third single young one hatched during transit, from a capsule subsequently sent me by Mr. Dove, is 12 mm. in length, and closely resembles in markings the shorter of the two above, but is quite as darkly pigmented as the adult. In this specimen the peripharyngeal aperture is 8 mm. from the anterior tip, genital opening not visible. The first capsule was despatched to me by Mr. Dove on 13th September, and the other on 2nd October, 1899. The former was laid during the night between the 12th and 13th September, and as the box containing it reached me with the

young ones hatched out in 8 days after, the period of hatching is probably just within that time. The second capsule was found by Mr. Dove already deposited, lying beside the adult, and occupied a similar time in transit. The darker pigmentation of the young individual from this capsule and its somewhat greater length, together with the fact of the capsule having been already laid when found, lead me to infer that it was some days older than the others.

The capsules of this species are about 4 mm. in diameter.

Geoplana lyra, n.sp.

(Pl. xli., fig. 2.)

Colour of dorsal surface light yellow, with three sharply defined lines of dark brown. Starting from anterior end the lines are of equal width until just over the peripharyngeal opening, when they become somewhat broader, the median one more so than the others, and continue thus as far as the genital aperture, when they again resume their original proportions.

The group of lines is well in the centre of the body, having a clear space between the lateral ones and the sides of about $\frac{1}{3}$ of the total width of the body, and somewhat resembling the arrangement of the strings of a stringed musical instrument. At both ends the lines merge into one another. The anterior tip is coloured brown.

Ventral surface of a somewhat paler yellow than the dorsal, without markings.

Eyes as usual, in a single row round anterior tip and in a straggling line with moderate grouping for some distance down the sides.

In a spirit specimen, which is 25 mm. long by $3\frac{1}{2}$ mm. at widest part, the peripharyngeal opening is 15 and the genital aperture is 20 mm. from anterior tip. The same example when crawling had a length of about 40 mm. Another individual was 50 mm. in length when crawling. In repose the body is drawn up to a broad strap-shape.

Hab.—Table Cape, Tasmania (Mr. H. Stuart Dove and Mr. Easton).

In spirit the yellow colour dissolves, leaving the body white, the brown lines remaining unchanged.

From the description alone this species might be confused with the three-lined form of *G. mediolineata*, Dendy (4, p. 77), but it is readily distinguished by its totally different shape and by the very central position of the group of lines.

Geoplana Tasmaniana (Darwin).

(Pl. xli., figs. 3 and 4.)

Planaria Tasmaniana, Darwin (1, p. 244); *Geoplana Tasmaniana*, Fletch. & Hamil., (2, p. 361), Dendy (6, p. 178; 7, p. 369; 8, p. 421), Graff (10, p. 370); *Geoplana balfouri*, Graff (10, p. 375, Pl. v., figs. 31-33). Other references are given by the authors cited above.

In 1844 Darwin (1, p. 244) somewhat meagrely described this species, the only one with which he met in Tasmania. For many years no further land planarians appear to have been collected in Tasmania until in 1893 Dendy (6, p. 178) gave a full description, amongst other species, of a form which he considered to be identical with that originally made known by Darwin. Graff (10, pp. 370 and 375), having material sent by Dendy before him, concludes that the latter was mistaken in his identification, and accordingly renames Dendy's specimens as *Geoplana balfouri*, leaving Darwin's species as unverified.

Now the planarian identified by Dendy as *G. Tasmaniana* is probably the commonest and most widely spread species occurring in Tasmania, and, so far as my knowledge goes, the only one at all referable to Darwin's description, and it is rather improbable that the one species collected by Darwin on the occasion of a casual visit, and mentioned by him as "frequent," should be a form never since met with.

After carefully studying a large series of examples sent to me by Mr. Dove from Trevallyn Hills near Launceston, and from Table Cape, which certainly belong to the species dealt with by Dendy as *G. Tasmaniana*, and figured by Graff as *G. balfouri*, I

am of the opinion that Dendy was correct in his identification, and that Graff has fallen into an error in re-naming the species.

Darwin is clearly speaking of the dorsal surface as a whole when he says in his description :—"Colour dirty 'honey-yellow,' with a central dark brown line bordered on each side with a broader line of pale 'umber-brown.'" So that we have here a description of a worm having a dirty honey-yellow dorsal surface margined by broad umber-brown stripes, and with a dark brown median line (Pl. xli., fig. 3). This description tallies exactly with the larger proportion of the specimens of this species which I have seen, as do also the arrangement of the eyes, the dimensions of the body, and the position of the orifices, as stated by Darwin. Graff has evidently misread this description, for he refers to *G. Tasmaniana* as having one band or stripe, whereas Darwin very plainly mentions three.

Dendy (*loc. cit.*) speaks of there being five dorsal lines or bands, comprised of the median line, lateral bands and marginal stripes, and states that on preservation in spirit the margins of the dorsal surface with their stripes become turned in to form lateral surfaces. In my experience the above marginal stripes should more properly be spoken of as submarginal, for they are distinctly situated in the living animal just beneath the dorsal edge, and indeed I should without hesitation have termed them ventro-marginal. I shall, however, speak of them in the sequel as submarginal. Certainly the species is somewhat variable in its markings, the narrow submarginal stripes not being constantly present, while the broad lateral bands are most erratic in their extent. I possess a series of specimens, in some of which not only are the submarginal stripes quite absent, but the lateral bands are also suppressed save for about one-third of the length of the body at the anterior end, the remainder of the dorsal surface, with the exception of the dark median line, which is a constant character, being of a speckled colour, which is exactly expressed by Darwin's term "dirty honey-yellow." This form bears a good deal of resemblance to the Australian species *G. ornata*, Fletch. & Hamil. In others the lateral bands are broadened

out so as to cover the whole dorsal surface except a narrow strip of dirty yellow on either side of the median line, the submarginal stripes being also strongly defined. Between these two extremes there are many gradations.

A medium specimen in spirit is 30 mm. in length, with the peripharyngeal opening 19 and the genital aperture 24 mm. from anterior tip. A small example 20 mm. in length has the relative positions of the apertures 11 and 14½ mm. respectively.

On two occasions examples of this species sent me by Mr. Dove from Trevallyn Hills deposited egg-capsules. The first was laid about June 2, 1899, and failed to hatch. The other deposited in July of same year hatched out in my vivarium about 4th September, some seven weeks after being laid. In both cases the capsules were between 2 and 3 mm. in diameter. From the one which hatched there emerged four young, three of which were about 13 mm. in length when fully extended, the fourth being only about half that size. The ground colour of dorsal surface was milk-white, sprinkled all over with brown speckles, tending to arrange themselves in an irregular median band.

Ventral surface also milk-white, with no markings. Eyes in a single row round the entire margin, with no side grouping.

Two of the little ones fed on flies which I disabled and gave to them, and remained alive for between 2 or 3 weeks, but eventually died. During this time the pigmentation of the dorsal surface became much darker.

One of the specimens of *G. Tasmaniana*, from Trevallyn Hills, after preservation in spirit has two pharyngeal tubes extruded, each of which is about one-half of the usual size (Pl. xli., fig. 4). Amongst the many hundreds of land planarians which I have preserved I have never observed a similar case.

GEOPLANA TASMANIANA (Darwin), var. FLAVICINCTA, var.n.

(Plate xli., fig. 5.)

This handsome variety agrees in every respect with the type except that around the margin of the dorsal surface there is a border of light yellow, giving the animal a very striking appearance, as if it were set in a yellow frame.

A spirit specimen 27 mm. long by 4 mm. wide at broadest part, has the dorsal pigmented area 3 mm. in width and bordered by $\frac{1}{2}$ mm. of yellow margin.

The eyes, which are in a single row with a few scattered individuals, are rendered conspicuous by being situated on the light-coloured margin which extends all round at the tips as well as the sides, completely framing the coloured area of dorsal surface. The submarginal stripes are entirely absent, the ventral surface being uniform white or pale yellow.

In same specimen the peripharyngeal opening is 15 and the genital 20$\frac{1}{2}$ mm. from anterior tip.

Hab.—Trevallyn Hills near Launceston, Tasmania (Mr. H. Stuart Dove).

In a small collection of land planarians from Rotorua, New Zealand, given to me by my friend Mr. C. Cooper, of Auckland, there is one small specimen, probably immature, of an apparently undescribed form, which bears a remarkable resemblance to the above variety. This specimen in formaline has a very dark brown narrow dorso-median line with dark brown on either side, paler next median line, and darkest next marginal space. Marginal space cream-white. Marginal spaces each $\frac{1}{4}$ of total width, coloured area $\frac{1}{2}$ of same. Length 12 mm. by 2 mm. in width. Peripharyngeal aperture 9 mm. from anterior tip, genital opening not visible. Anterior tip brown, not inclosed by light margin, differing in this respect from the above-described Tasmanian form. Eyes in a single somewhat straggling row, with bare indications of grouping.

The only external point of difference between this little planarian and a small example of *G. Tasmaniana* var. *flavicincta*, is that the pale margin does not extend round the anterior tip.

Geoplana diemenensis, Dendy.

(Plate xli., fig. 8.)

G. diemenensis, Dendy (6, p. 179; 8, p. 421); *Artioposthia diemenensis*, Graff, (10, p. 404, Pl. v., figs. 20-24).

This species was not figured by Dendy, and by his description alone it is not easy to distinguish from *G. Tasmaniana*. Graff,

however, gives excellent figures of specimens sent to him by Dendy, and from these identification can be readily made.

I have received from Mr. Dove a small series of examples from Trevallyn Hills and Table Cape, in which are included individuals having the range of markings illustrated by Graff.

Graff's figures 20 and 21 (*op. cit.*) have reference to specimens of the typical form from Mount Wellington, while 22-24 represent examples of Dendy's "slight variety" found by Professor Spencer at Parattah. I have not seen specimens of the "slight variety," but all my examples with markings corresponding to Graff's figures thereof correspond in size and stoutness with the typical form (Pl. xli., fig. 8). I have some doubt if more than one species is not here involved, but Dendy and Graff appear to be satisfied on the point.

Geoplana Mortoni, Dendy.

(Plate xli., figs. 6 and 7.)

Geoplana Mortoni, Dendy, (6, p. 181; 8, p. 421), Graff (10, p. 349).

Mr. Dove has sent me specimens of this fine species from Trevallyn Hills near Launceston, and Table Cape. Those from the former locality are all of the finely speckled forms (Pl. xli., fig. 6), and in the specimens from the latter place the markings are coarser. Some of the Table Cape specimens, in addition to the characteristic brown specks, have an aggregation of mottlings of a darker shade of brown, forming very straggling lateral bands, one on either side of a dorso-median space (Pl. xli., fig. 7). These supplementary bands range in different specimens from the barest indication to the very distinctly banded form illustrated. They bear a close analogy to the markings on the series of specimens of *G. Fletcheri*, Dendy, from Mount Lofty, South Australia, described by Dendy, (6, p. 185) to which he gave the varietal name *Adelaidensis*.

Ventral surface exactly as in Dendy's description. A specimen with strongly marked bands is in spirit 42 mm. in length with the peripharyngeal opening 22 mm. and the genital aperture 30 mm. from anterior tip.

An egg-capsule of this species from a specimen collected at Trevallyn Hills, and laid during transit from Launceston, was about 4 mm. in diameter. It hatched out a few days after being placed in my vivarium, when 11 young emerged on 1st August, 1900. These were 5 mm. long, by about 1 mm. broad at widest part. The colour of both surfaces is milk-white. The anterior tip both above and below is coloured brown through aggregation of brown speckles similar to those on adult. These specklings are on both surfaces continued sparingly down the margins, forming ill-defined marginal bands for a variable distance back. Remainder of surface very sparingly dotted with specklings. Orifices not visible.

Eyes conspicuous, in a single row round the entire margin of the body, somewhat closer together at anterior than posterior end.

The appearance of the parent worm after laying the above capsule is described and figured in Part ii. of my foregoing paper on Australian Land Planarians. Pl. xli., fig. 6, in present paper shows the position of the opening. It should be mentioned that the peculiar comb-like glandular genital organs there mentioned would, according to Graff's definition, cause this species to be included in his genus *Artioposthia*. In his monograph he leaves the species in the genus *Geoplana*, and does not mention the structure of the genital organs.

In all external characters my specimens agree precisely with Dendy's description, and with Graff's figures in so far as they go.

Geoplana sanguinea (Moseley).

This common and widely distributed Australian species has not hitherto been recorded from Tasmania. Dendy (7, p. 370) at first identified a form devoid of eyes as *G. alba*, Dendy (*syn. G. sanguinea*), but subsequently (6, p. 184, and 8, p. 420) described it as a distinct species under the name of *G. typhlops*. The distinguishing external feature between the two species is the possession or otherwise of eyes. All the examples from Tasmania examined by Dendy had no eyes, and hence were assigned by him to *G. typhlops*.

From Table Cape Mr. Dove has sent me alive a number of specimens in which the eyes are plainly visible, and which in the arrangement and size of these, and all external respects, are identical with Australian examples of *G. sanguinea*. From the same place, and also from his garden at Launceston, he has forwarded specimens which careful anatomical examination shows to be devoid of eyes and which are otherwise externally indistinguishable from *G. sanguinea*, thus answering in all respects to Dendy's description of *G. typhlops*.

The largest specimen of *G. sanguinea* from Table Cape, after preservation in spirit, is 103 mm. in length, and has the peripharyngeal opening 63 mm., and the genital aperture 72 mm. from anterior tip. Of the specimens of *G. typhlops* from same locality the three largest specimens, in spirit, have the following dimensions stated as above, the first of these was 115 mm. in length when crawling :—

Total length.	Peripharyngeal aperture.	Genital opening.
90	64	76 mm.
83	54	66 mm.
80	54	67 mm.

It is interesting to find these two forms thus associated with one another.

Geoplana Sugdeni, Dendy.

Geoplana sugdeni, Dendy (4, p. 76, Pl. vii., figs. 12-14).

Of this common Victorian species I have received one specimen from Table Cape, and Mr. Dove mentioned sending me several others from the same place, which perished in transit. This is the first record of the species from Tasmania.

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EXPLANATION OF PLATE XLI.

Fig. 1.—*Geoplana Dovei*, n.sp. Dorsal aspect (nat. size).
Fig. 2.— ,, *lyra*, n.sp. Dorsal aspect (×2).
Fig. 3.— ,, *Tasmaniana* (Darwin). Dorsal aspect (×2).
Fig. 4.— ,, ,, ,, Ventral aspect of another individual showing double pharyngeal tube (×2).
Fig. 5.— ,, *Tasmaniana* (Darwin), var. *flavicincta*, n.var. Dorsal aspect (×2).
Fig. 6.— ,, *Mortoni*, Dendy. Dorsal aspect showing opening caused by exit of egg-capsule (×1½).
Fig. 7.— ,, *Mortoni*, Dendy. Dorsal aspect, banded form (×1½).
Fig. 8.— ,, *diemenensis*, Dendy. Dorsal aspect (×1½).

The outline beneath each figure represents the section of the body at middle.